



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/667,966	09/22/2000	ZEWU CHEN	0444.035	1170

23405 7590 05/06/2003

HESLIN ROTHENBERG FARLEY & MESITI PC  
5 COLUMBIA CIRCLE  
ALBANY, NY 12203

EXAMINER
----------

BARBER, THERESE

ART UNIT	PAPER NUMBER
----------	--------------

2882

DATE MAILED: 05/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/667,966

Applicant(s)

CHEN, ZEWU

Examiner

Therese Barber

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-6,8-18,21,22,24 and 41-64 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 14-17,41-48,57 and 64 is/are allowed.
- 6) ☒ Claim(s) 1,3-6,8-13,18,21,22,24,49 and 50 is/are rejected.
- 7) ☒ Claim(s) 51-56 and 58-63 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 14.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The additional drawings, figs. 8-10, were received on 6 February 2003. However, the addition of these drawings required a narrative in the "Brief Description of the Drawings" section of the patent application.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3-6, 9, 10-13 and 18, 21, 22, 24, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wittry (USPN 5,892,809) and Ohsugi et al. (USPN 5,249,216).

4. Regarding claims 1, 3-6, 9, 10-13, 18, 21, 22, 24, 49 and 50, Wittry fails to disclose that the surface is an optical reflection surface, the surface is a semiconductor wafer and that foreign matter is present on the surface.

5. Regarding claims 1, 3-6, 9, 10-13, 18, 21, 22, 24, Wittry discloses a total reflection x-ray fluorescence apparatus (col. 5, lines 24-26) comprised of an x-ray source for providing x-ray (col. 5, lines 51-61); a doubly-curved x-ray optic for diffracting and focusing the x-rays provided by the x-ray source (10 and 11; col. 3, lines 33-34); a surface onto which at least some of the

Art Unit: 2882

diffracted and focused x-rays are directed (30); an x-ray detector for detecting resultant x-ray fluorescence (col. 3, lines 37-40); wherein the doubly-curved x-ray optic is a crystal or a multi-layer x-ray optic (col. 6, lines 54-62); wherein the doubly-curved x-ray optic has one or more atomic planes (col. 3, lines 16-20); wherein the atomic planes are curved to form a toroidal, ellipsoidal, spherical, parabolic, or hyperbolic shape (col. 3, lines 16-20); wherein the one or more apertures for limiting the convergent angle of the diffracted x-rays (27; col. 6, lines 38-40) are positioned before the doubly curved x-ray optic (fig. 3); wherein the one or more aperture produced a convergent angle for the diffracted x-rays (fig. 1); wherein the doubly-curved x-ray optic employs Bragg's law in diffracting the x-rays (col. 3, lines 20-25); and an analyzer for analyzing the x-ray fluorescence detected by the detector (col. 7, lines 49-54; fig. 6).

Ohsugi discloses a total reflection x-ray fluorescent apparatus (figs. 3 and 4) wherein the surface is an optical reflection surface, the surface is a semiconductor wafer and that foreign matter is present on the surface (col. 2, lines 6, lines 9-11).

It would have been obvious to one having ordinary skill in the art at the time the invention was made the surface of the sample of the total reflection x-ray fluorescence apparatus as disclosed by Wittry could be modified to incorporated a semiconductor wafer having an optical reflection surface as disclosed by Ohsugi. Accordingly, the motivation is the resultant structure will be utilized in analyzing surface contamination on the surface of a semiconductor wafer, thereby, reducing the cost of manufacturing semiconductor wafers by testing a number of waters to determine if any particles are located on the surfaces of the semiconductor wafers.

6. Claims 8, 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wittry and Ohsugi.

Art Unit: 2882

7. Regarding claims 8, 49 and 50, Wittry fails to disclose that the apertures are elongated slots and that the one or more apertures are positioned after the x-ray optic.

Wittry discloses a total reflection x-ray fluorescence apparatus (col. 5, lines 24-26) comprised of an x-ray source for providing x-ray (col. 5, lines 51-61); a doubly-curved x-ray optic for diffracting and focusing the x-rays provided by the x-ray source (10 and 11; col. 3, lines 33-34); a surface onto which at least some of the diffracted and focused x-rays are directed (30); an x-ray detector for detecting resultant x-ray fluorescence (col. 3, lines 37-40); and wherein the one or more apertures for limiting the convergent angle of the diffracted x-rays (27; col. 6, lines 38-40). Furthermore, Wittry discloses that the apertures can be utilized to obtain electron beam spot sizes that are different in size depending upon the current (col. 6, lines 38-40).

Ohsugi discloses a total reflection x-ray fluorescent apparatus (figs. 3 and 4) wherein x-ray emission are collimated to a fine x-ray beam by a slit (2; col. 7, line 68 and col. 8, lines 1-2) and x-rays are incident onto the detector via a slit (5; col. 8, lines 18-21) and that the slit(s)

It would have been obvious to one having ordinary skill in the art at the time the invention was made the apertures of the total reflection x-ray fluorescence apparatus as disclosed by Wittry could be modified to incorporated to a slit as disclosed by Ohsugi. Accordingly, the motivation is the resultant structure will be able to minimize the amount of x-rays that are incident to the x-ray optics, thereby, preventing any scattered x-rays from striking the surface of the sample or to control the size of the x-ray beam as it enters the detector, depending upon the positioning of the slit apertures within the total reflection x-ray apparatus.

***Allowable Subject Matter***

9. Claims 14-17, 41-48, 57 and 64 are allowed.
10. Regarding claims 14-17 and 57, the prior art fails to teach or to reasonably suggest wherein a total reflection x-ray fluorescence apparatus is comprised of a x-ray source for providing the x-rays; a doubly-curved x-ray optic for diffracting the x-rays, a surface onto which at least some of the diffracted x-rays are directed; an x-ray detector for detecting the resultant x-ray fluorescence emitted by any foreign matter present on the surface; wherein the locations of the doubly-curved x-ray optic, x-ray source, and point of impingement upon the surface define an optical circle of radius  $R$ , wherein the doubly-curved x-ray optic has an optical surface of radius  $2R$  and one or more atomic planes are essentially parallel with the optic surface, as set forth in the claimed combination.
11. Regarding claims 41-48 and 64, the prior art fails to teach or to reasonably suggest wherein a total reflection x-ray fluorescence apparatus comprised of a x-ray source for providing the x-rays; a doubly-curved x-ray optic for diffracting the x-rays, a surface onto which at least some of the diffracted x-rays are directed; an x-ray detector for detecting the resultant x-ray fluorescence emitted by any foreign matter present on the surface; the x-ray source and the point of impingement upon the surface define an optic circle of radius  $R$ , and wherein the doubly-curved x-ray optic comprises a surface and a plurality of atomic plane of radius  $R_p$ , which intersect the surface at an angle  $\alpha$ ; and wherein the radius of the atomic planes  $R_p$  of the doubly-curved optic is defined by the equation  $R_p = 2R \cos \alpha$ , as set forth in the claimed combination.

Art Unit: 2882

12. Claims 51-56 and 58-63 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Regarding claims 51 and 58 would be allowable if rewritten to include the claim limitations of claims 1 and 18, respectively, because the prior art fail to teach or to reasonably suggest an apparatus and method for detecting of foreign matter by total x-ray diffraction utilizing a doubly curved x-ray optic for diffracting and focusing the x-rays wherein the doubly curved x-ray optic is comprised of a backing plate having a supportive surface; an adhesive layer disposed above the supporting surface of the backing plate, with the adhesive layer having a minimum thickness  $x$ ; and an optical layer disposed above the adhesive layer, the optical layer comprised of an optical surface, the optical surface of the optical layer having a desired curvature, and the optical layer having a thickness  $y$ , wherein  $x > y$ , as set forth in the claimed combination.

#### ***Response to Amendment***

14. The applicants have added claims 51-64 and canceled claims 2,7, 19, 20, and 23. The applicants have canceled claims 25-40.

15. The examiner maintains the rejections of claims 1, 3-7, 9, 10-13 and 18-24 utilizing the Wittry and Ohsugi references for 35 U.S.C. 103(a) rejections.

#### ***Double Patenting***

16. Claims 51 and 58 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,285,506 B1. Although

Art Unit: 2882

the conflicting claims are not identical, they are not patentably distinct from each other because the subject matter deemed as patentably distinct is the optically curved element comprised of a backing plate having a supportive surface; an adhesive layer disposed above the supporting surface of the backing plate, with the adhesive layer having a minimum thickness  $x$ ; and an optical layer disposed above the adhesive layer, the optical layer comprised of an optical surface, the optical surface of the optical layer having a desired curvature, and the optical layer having a thickness  $y$ , wherein  $x > y$  in claim 1 of USPN 6,285,50. In pending application number 09/667,966, claims 1 and 18 would be allowable if rewritten to contain elements of claims 51 and 58, wherein the patentably distinct subject matter would be the doubly curved x-ray optic for diffracting and focusing the x-rays wherein the doubly curved x-ray optic is comprised of a backing plate having a supportive surface; an adhesive layer disposed above the supporting surface of the backing plate, with the adhesive layer having a minimum thickness  $x$ ; and an optical layer disposed above the adhesive layer, the optical layer comprised of an optical surface, the optical surface of the optical layer having a desired curvature, and the optical layer having a thickness  $y$ , wherein  $x > y$ .

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Therese Barber whose telephone number is (703) 306-0205. The examiner can normally be reached on Monday to Friday from 8:30 a.m. to 6:00 p.m..




Art Unit: 2882

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-4857 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

tb   
April 29, 2003

  
**DAVID V. BRUCE**  
**PRIMARY EXAMINER**